

LANTHANIDE OXIDE / HAFNIUM OXIDE DIELECTRICS

ABSTRACT

Dielectric layers containing a chemical vapor deposited hafnium oxide and
5 an electron beam evaporated lanthanide oxide and a method of fabricating such a
dielectric layer produce a reliable dielectric layer having an equivalent oxide
thickness thinner than attainable using SiO₂. Forming a layer of hafnium oxide by
chemical vapor deposition and forming a layer of a lanthanide oxide by electron
beam evaporation, where the layer of hafnium oxide is adjacent and in contact with
10 the layer of lanthanide, provides a dielectric layer with a relatively high dielectric
constant as compared with silicon dioxide. Forming the layer of hafnium oxide by
chemical vapor deposition using precursors that do not contain carbon permits the
formation of the dielectric layer without carbon contamination. The dielectric can
be formed as a nanolaminate of hafnium oxide and a lanthanide oxide.